Appendix B

Safety Category Designation and Record

414.02
04/18/2001
Rev. 04

SAFETY CATEGORY DESIGNATION AND RECORD

Safety Category Evaluation Performed By: Richard P. Wells Date: 12/16/2002

Facility/Structure/System/Component: ARA-01, ARA-12, and ARA-23 Hazard Category: < 3

IDENTIFICATION OF ITEM	SAFETY CATEGORY DESIGNATION	TECHNICAL JUSTIFICATION
Remedial actions at the Operable Unit 5-12 sites listed above.	Consumer Grade	*Hazard Classification for Remedial Activities at Eleven OU 5-12 Sites: ARA-01, ARA-02, ARA-07, ARA-08, ARA-12, ARA-13, ARA-16, ARA-21, ARA-23, ARA-25, and PBF-16* (INEEL/EXT-2000-00532) and the *Health and Safety Plan for Operable Unit 5-12 Remedial Design/Remedial Action Projects* (INEEL/EXT-2000-00515)

Note: Identify and record safety category in accordance with MCP-540, and obtain appropriate approvals. Completed and approved form becomes a part of the safety basis documentation.

D. S. SWANSON		12/17/02
Safety Analysis Supervisor Concurrence Printed/Typed Name	Safety Analysis Supervisor Concurrence Signature	Date
R. E. JAMES		12/19/02
Facility/Program/Project Approval Printed/Typed Name	Facility/Program/Project Approval Signature	Date

Appendix C

Air Emissions from WAG 5 Contaminated Soil Remediation Activities

Appendix C

Particulate, Radionuclide, and Hazardous Air Pollutant Emissions from Remediation Activities

WAG 5: ARA-01, ARA-12, and ARA-23

Presented herein are the assumptions and calculations used to estimate air emissions of particulates and radionuclide and/or hazardous air pollutants that could result from planned soil remediation site activities at Auxiliary Reactor Areas (ARAs). These calculations are intended to satisfy the requirements of 40 CFR 61.92 and 61.94(a), "NESHAPS for Emissions of Radionuclides Other than Radon from DOE Facilities," and the IDAPA 16.01.01.585 and .586, "Toxic Substances."

The following tables summarize the sites addressed in the Phase II Work Plan along with the estimated volume of contaminated media to be removed and the contaminants of concern (COCs). This information is based on the site descriptions and estimates as presented in the description of the nature and extent of contamination and human health risk assessment results presented in the PBF and ARA Record of Decision (ROD) (DOE-ID 2000).

Contaminated material volumes and air emissions of particulates and COCs from the planned remediation activities are presented in the following tables. The particulate emission estimates were based on emission factor calculations for two scenarios during remediation: (1) movement of equipment heavy equipment on the contaminated surface (i.e., unpaved roads), and (2) handling of contaminated material (i.e., pickup and dropping). Estimates for these two scenarios were calculated based on the equations presented in Sections 13.2.2 and 13.2.4 of the Fifth Edition of the Compilation of Air Pollutant Emission Factors (AP-42).

Based on the calculated particulate emissions, an estimate of the potential release of radionuclides and/or hazardous air pollutants associated with the remediation was calculated. The calculations were based on the upper confidence limit or maximum contaminant concentration (i.e., whichever was deemed appropriate for use in the human health risk assessment) as presented in the ROD (DOE-ID 2000). For radionuclides, the release, in curies, was used as input to the CAP88PC Model, an EPA approved computer code. CAP88PC calculates the radionuclide dose to a maximally exposed individual receptor at the INEEL boundary. The outputs are included as Attachment J1. The estimated dose is then compared to the NESHAPS limit of 10 mrem/yr for a member of the public. For nonradiological COCs, the release in lbs/hr was estimated for comparison to the screening emission limit (EL) values as presented in the IDAPA 16.01.01.585, and .586. Where ELs were exceeded, air concentrations at the appropriate receptor locations were calculated with the SCREEN3 code, for comparison to acceptable ambient concentrations for carcinogens (AACC), also presented in IDAPA 16.01.01.585 and .586. The SCREEN3 output file is included in Attachment J2.

The total emissions (in lbs) were calculated by multiplying the emission rates by the time it takes to remove all the contaminated material. The amount of material to be moved per hour (61.92 ton/hr) was estimated for TAN TSF-06, Area B Site remediation and assumed to be appropriate for use herein. The estimate was calculated by taking the amount of material transported per dump truck load (12 yd^3) multiplied by four loads per hour and the weight of soil per yd^3 (1.29 ton/yd^3). The time to excavate the contaminated volume was estimated by dividing the total weight of the material by the amount of material to be moved per hour.

Table C-1. Volume estimate for ARA-01 from DOE (2000a).

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	32,155 $ft^2 \times 2$ ft removal	64,310	2,382	6,145,178	3,073

Assuming that the COC contamination is homogeneously distributed throughout the contaminated media and will be released with particulates, radionuclide activity or concentration released was calculated by multiplying the particulate emissions by the soil concentrations (see Table C-2).

Table C-2. Particulate/HAP Emission Calculations – ARA-01.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	3,073	3,073	3,073	3,073	3,073
Amount of material moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	49.6	49.6	49.6	49.6	49.6
Material Handling (i.e., Pickup and Dropping)					
Emission factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate emissions (lbs)	2.97E+00	1.93E+00	1.41E+00	8.05E-01	4.43E-01
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission factors (lbs/VMT)	9.29E+00	-	2.85E+00	-	4.17E-01
Emission rates (lbs/hr)	9.29E-01	-	2.85E-01	-	4.17E-02
Particulate emissions (lbs)	4.6E+01	-	1.4E+01	-	2.1E+00
Total Particulate Emissions					
Emission rates (lbs/hr)	9.9E-01	3.9E-02	3.1E-01	1.6E-02	5.1E-02
Particulate emissions (lbs)	4.9E+01	1.93E+00	1.5E+01	8.05E-01	2.5E+00
Emission/Release Calculations					
Arsenic (mg/kg in soil)			22.1		
Arsenic (mg/lb)			10.02		
Total particulate emission (lb)			69.2		
Arsenic (mg) (69.2 lbs * 10.02 mg/lb)			706		
Arsenic (lb) (706 mg *1E-03 mg/g / 454 g/lb)			1.56E-3		
Arsenic (lb/hr) (1.56E-03 lbs/49.6 hr) (Acute Release)			3.14E-05		
Arsenic (lb/hr) Annual Average (Chronic Release)			1.78 E-07		
State of Idaho Emission Limit[a] (lb/hr) for arsenic compounds			1.5E-06		

a. Rules for the Control of Air Pollution, IDAPA 58.01.01.586.

Table C-3. Volume estimate for ARA-12.

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	2,337 $ft^2 \times 1$ ft removal + 43,278 $ft^2 \times 0.5$ ft removal	23,976	888	2,291,040	1,145

Table C-4. Particulate/Radionuclide emission calculations – ARA-12.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	1,145	1,145	1,145	1,145	1,145
Amount of material moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	18.5	18.5	18.5	18.5	18.5
Material Handling (i.e., Pickup and Dropping)					
Emission factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate emissions (lbs)	1.12E+00	7.2E-01	5.2E-01	3.0E-01	1.6E-01
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission factors (lbs/VMT)	9.29E+00	-	2.85E+00	-	4.17E-01
Emission rates (lbs/hr)	9.29E-01	-	2.85E-01	-	4.17E-02
Particulate emissions (lbs)	1.7E+01	-	5.3E+00	-	4.2E-01
Total Particulate Emissions					
Emission rates (lbs/hr)	9.9E-01	3.9E-02	3.1E-01	1.6E-02	5.1E-02
Particulate emissions (lbs)	1.8E+01	7.2E-01	5.8E+00	3.0E-01	6.0E-01
Emission/Release Calculations[a]					
Chromium soil concentration (mg/kg)			469		
Chromium soil concentration (mg/lb)			212,926		
Release rate during excavation (lb/hr)			5.75E-04		
Annual average release rate (lb/hr)			1.22E-06		
State of Idaho emission limit for Cr(VI) (lb/hr)			5.60E-07		
Concentration at INEEL boundary ($\mu g/m^3$)			5.45E-07		
State of Idaho AACC for Cr(VI) ($\mu g/m^3$)			8.30E-05		
Ag-108m soil concentration (pCi/g)			67.2		
Ag-108m as Cs-137 (2.24 x 67.2) (pCi/g)[b]			151		
Cs-137/Ba-237m[c] soil concentration (pCi/g)			2.2		
Cs-137/Ba-137m soil concentration modeled (Ag-108m as Cs-137 plus Cs-137/Ba-137 soil concentration) (pCi/g)			153		

Table C-4. (continued).

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Cs-137/Ba-137m soil concentration modeled (pCi/lb)			69,462		
Cs-137/Ba-137m release modeled (Ci)			1.6E-06		
Co-60 soil concentration (pCi/g)			25.2		
Co-60 soil concentration (pCi/lb)			11,441		
Co-60 release modeled (Ci)			2.6E-07		
U-234 soil concentration (pCi/g)			1.2		
U-234 soil concentration (pCi/lb)			545		
U-234 soil concentration modeled (Ci)			1.2E-08		
U-238 soil concentration (pCi/g)			1.1		
U-238 soil concentration (pCi/lb)			513		
U-238 soil concentration modeled (Ci)			1.2E-08		
Total dose to MEI[d] at INEEL boundary, 10,460 m (11,440 yd) south-southwest of ARA-12 (mrem)			4.1E-07		

a. As calculated by SCREEN3 code to nearest INEEL boundary, 9,154 m (10,011 yd) south of ARA-12. A persistence factor of 0.125 is applied to the output concentration.

b. Because CAP-88 does not include Ag-108m in its library, Cs-137 is used as a surrogate. Equivalent Cs-137 is derived from the ratio of HEAST inhalation slope factors. This ratio is 2.24:1, Ag-108m to Cs-137.

c. Ba-137m is a decay product of Cs-137. Both are assumed to be present at equal activities.

d. MEI = maximally exposed individual

Table C-5. Volume estimate for ARA-23.

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	2,510,000 ft^2 by 0.5 ft removal depth	1,255,000	46,481	1.2E+08	59,961

Table C-6. Particulate/Radionuclide emission calculations – ARA-23.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	59,961	59,961	59,961	59,961	59,961
Amount of material moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	968	968	968	968	968
Material Handling (i.e., Pickup and Dropping)					
Emission factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate emissions (lbs)	5.8E+01	3.8E+01	2.7E+01	1.6E+01	8.6E+00
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission factors (lbs/VMT)	1.4E+01	-	4.0E+00	-	5.9E-01
Emission rates (lbs/hr)	1.5E+01	-	4.05E-01	-	5.9E-02
Particulate emissions (lbs)	1.4E+04	-	3.9E+02	-	5.7E+01
Total Particulate Emissions					
Emission rates (lbs/hr)	1.5E+01	3.9E-02	4.05E-01	1.6E-02	5.9E-02
Particulate emissions (lbs)	1.4E+04	3.8E+01	4.2E+02	1.6E+01	6.6E+01
Emission/Release Calculations					
Cs-137/Ba-137m soil concentration (pCi/g)[a]			88.5		
Cs-137/Ba-137m soil concentration (pCi/lb)			40,179		
Cs-137/Ba-137m release modeled (Ci)			5.8E-04		
Sr-90/Y-90[a] soil concentration (pCi/g)			25.1		
Sr-90/Y-90 soil concentration (pCi/lb)			11,395		
Sr-90/Y-90 release modeled (Ci)			1.7E-04		
Total dose to MEI at INEEL boundary, 8,700 m (9,500 yd) south-southwest of ARA-23 (mrem)			1.6E-04		

a. Ba-137m is a decay product of Cs-137. Both were assumed to be present, at equivalent activities. This also applies to Sr-90 and Y-90.

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Attachment C1

C A P 8 8 - P C

Version 2.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Feb 24, 2003 12:48 pm

Facility: INEEL
Address:
City:
State: ID Zip:

Source Category:
Source Type: Area
Emission Year: 2003

Comments:

Effective Dose Equivalent
(mrem/year)

4.07E-07

At This Location: 10460 Meters Southwest
Dataset Name: ARA_12
Dataset Date: Feb 24, 2003 12:48 pm
Wind File: C:\CAP88PC2\WNDFILES\PBF10Y.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 10460 Meters Southwest
Lifetime Fatal Cancer Risk: 9.03E-12

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	3.66E-07
BREAST	3.45E-07
R MAR	3.01E-07
LUNGS	9.32E-07
THYROID	3.60E-07
ENDOST	3.91E-07
RMNDR	3.11E-07
EFFEC	4.07E-07

RADIONUCLIDE EMISSIONS DURING THE YEAR 2003

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
CO-60	Y	1.00	2.6E-07	2.6E-07
CS-137	D	1.00	1.6E-06	1.6E-06
BA-137M	D	1.00	1.6E-06	1.6E-06
U-234	Y	1.00	1.2E-08	1.2E-08
U-238	Y	1.00	1.2E-08	1.2E-08

SITE INFORMATION

Temperature:	6 degrees C
Precipitation:	21 cm/y
Mixing Height:	800 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.
Area (sq m): 5744.

Plume Rise
Buoyant (cal/s): 0.
(Heat Release Rate)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

10460

C A P 8 8 - P C

Version 2.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Feb 24, 2003 02:04 pm

Facility: INEEL
Address:
City:
State: ID Zip:

Source Category:
Source Type: Area
Emission Year: 2003

Comments:

Effective Dose Equivalent (mrem/year)
1.64E-04

At This Location: 8700 Meters Southwest
Dataset Name: ARA_23
Dataset Date: Feb 24, 2003 02:04 pm
Wind File: C:\CAP88PC2\WNDFILES\PBF10Y.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 8700 Meters Southwest
Lifetime Fatal Cancer Risk: 3.81E-09

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.57E-04
BREAST	1.48E-04
R MAR	2.53E-04
LUNGS	1.26E-04
THYROID	1.54E-04
ENDOST	4.09E-04
RMNDR	1.33E-04
EFFEC	1.64E-04

RADIONUCLIDE EMISSIONS DURING THE YEAR 2003

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
CS-137	D	1.00	5.8E-04	5.8E-04
BA-137M	D	1.00	5.8E-04	5.8E-04
SR-90	D	1.00	1.7E-04	1.7E-04
Y-90	Y	1.00	1.7E-04	1.7E-04

SITE INFORMATION

Temperature:	6 degrees C
Precipitation:	21 cm/y
Mixing Height:	800 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.
Area (sq m): 233187.

Plume Rise
Buoyant (cal/s): 0.
(Heat Release Rate)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

8700

Attachment C2

```
  BEE-Line SCREEN3 Version  3.20
02/24/03

15:05:53
   Input File: ARA12.DTA
  Output File: ARA12.LST

  ***  SCREEN3 MODEL RUN  ***
  *** VERSION DATED 96043 ***

 ARA-12 remediation - Cr releases

 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE                =          AREA
    EMISSION RATE (G/(S-M**2)) =      .267620E-10
    SOURCE HEIGHT (M)          =        .0000
    LENGTH OF LARGER SIDE (M)  =     114.9096
    LENGTH OF SMALLER SIDE (M) =      49.9872
    RECEPTOR HEIGHT (M)        =        .0000
    URBAN/RURAL OPTION         =        RURAL

 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS
ENTERED.

    MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


 BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

 *** FULL METEOROLOGY ***

 *********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

   DIST      CONC              U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)    (UG/M**3)    STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
    400.   .3193E-03     6     1.0    1.0 10000.0     .00      0.
   9154.   .4361E-05     6     1.0    1.0 10000.0     .00      0.

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

  CALCULATION         MAX CONC    DIST TO   TERRAIN
   PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
 --------------    -----------   -------   -------
 SIMPLE TERRAIN      .3193E-03      400.        0.
```

```
**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

C1. REFERENCES

40 CFR 61.92, 2003, Part 61, "Natural Emission Standards for Hazardous Air Pollutants," Section 92, "Standard," *Code of Federal Regulations*, Office of the Federal Register, February 2003.

40 CFR 61.94(a), 2003, Part 61, "Natural Emission Standards for Hazardous Air Pollutants," Section 94, "Compliance and Reporting," *Code of Federal Regulations*, Office of the Federal Register, February 2003.

DOE-ID, 2000, *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area*, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, February 2000.

IDAPA 16.01.01.585-586, "Toxic Substances," Idaho Administrative Procedures Act.

Appendix D

Waste Management

Appendix D

Waste Management

D1. INTRODUCTION

This waste management plan will establish requirements for the management and disposal of any waste generated during the Phase II remedial activities at the Auxiliary Reactor Area (ARA) performed under Waste Area Group 10 at the Idaho National Engineering Laboratory (INEEL). Three sites are identified in this Work Plan for remedial activities (ARA-01, ARA-12, and ARA-23). Detailed regulatory and remedial strategies are contained in the Work Plan and in the Record of Decision (ROD) (DOE-ID 2000).

The Phase II Work Plan describes remedial activities as, primarily, removal of radiologically contaminated surface soils and subsurface structures. The scope of this plan covers any industrial waste, low-level waste, Resource Conservation and Recovery Act (RCRA)-hazardous waste, and/or mixed low-level waste that may be generated as a result of these remedial activities. However, because of extensive characterization, it is expected that most or all of the waste streams generated during these activities will be industrial or low-level radioactive. This plan allows for the dispositioning of waste at on-Site Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or offsite disposal facilities when necessary. Waste Generator Services is responsible for the management of all waste generated during this project. Internal company procedures will be used for the identification, characterization, containerization, storage, and dispositioning of all waste generated.

Sections 1.1 through 1.7 provide general guidance on waste management activities (e.g., waste minimization, segregation, packaging). This plan also provides reference to the applicable waste management requirements established under Environmental Protection Agency (EPA) regulations, Department of Energy Idaho Operations Office (DOE-ID) documents, and company management control procedures (MCPs), as applicable. Section 1.8 provides site-specific summaries of remedial activities at each task site and the associated waste streams. Section 1.8 also provides volume estimates, anticipated waste classifications and waste codes, and probable disposition of each waste stream.

D1.1 Waste Minimization and Segregation

Waste minimization for this project will be primarily achieved through design and planning to maintain efficient operations. To achieve this goal, waste streams will be segregated primarily by the field activity that is being conducted at the time of generation, as appropriate. Industrial waste will be segregated from any hazardous and/or radioactive waste generated during these field activities. Reuse and recycling opportunities will be evaluated for such waste as batteries, scrap metal, or equipment/materials that are no longer needed. Uncontaminated equipment that is determined to be excess will be evaluated for reuse by other INEEL projects or government surplus sale.

D1.2 Waste Packaging, Labeling, and Transportation

Containers used to store CERCLA waste must be in good condition, compatible with the waste being stored, and properly labeled. The *Idaho National Engineering and Environmental Laboratory Waste Acceptance Criteria* (DOE-ID 2002) hereinafter referred to as the INEEL Waste Acceptance Criteria (WAC) details the criteria for waste packaging. Containers for the collection of this waste will be clearly labeled to identify waste type and maintained inside the work area until removal for subsequent

waste management activities. The INEEL WAC also provides guidance to ensure the containers selected for storage are compatible with final disposition plans and applicable to U.S. Department of Transportation (DOT) requirements. This will eliminate the need for repackaging the waste before shipping it to a treatment or disposal facility.

Drums, boxes, roll-off containers, or end-load dump trucks with liners may be used for waste materials, such as soil and other solid waste. The packaging is intended to protect against migration of contaminants and environmental degradation. This may include, but is not limited to, plastic wrap. Low-volume contaminated miscellaneous waste associated with activities may be bagged, taped, and labeled. To reduce the number of separate bags, similar waste may be combined and accounted for in one bag or container in consultation with Waste Generator Services (WGS) personnel. This bagged material will be transported in a protective manner (i.e., containment of the material is maintained) by the workers during site activities. The waste may be either directly transported to the disposal facility or accumulated in a container (or containers) at the CERCLA waste storage unit (CWSU) (or CERCLA storage area [CSA]) already established at ARA-I, and managed pending approval and transport to its final disposition path.

Containers will be labeled and marked appropriately to match the designation established for each waste stream. Radiation labels shall be placed on containers as required by the current version of the *INEEL Radiological Control Manual* (Radiological Control Department 2000). Uncontaminated wastes will be placed in containers marked as "Cold Waste." Containers will be marked with labels identifying them as "CERCLA Waste" if contaminated or as "Cold Waste" if uncontaminated.

The types of containers anticipated for storage include plastic bags, burrito bags, 19-L (5-gal) open-head drums, and 208-L (55-gal) open-head drums, and/or $0.6 \times 0.6 \times 1.2$ m ($4 \times 4 \times 8$ ft) metal waste boxes. These containers will be labeled with the standard green and yellow CERCLA labels. Information on the waste packaging will include the following:

- A unique bar code serial number
- Name of generating facility (i.e., OU 5-12)
- Phone number of generator contact
- Listed or characteristic waste code(s), if applicable
- Waste package gross weight
- Maximum radiation level on contact and at 1 m (3.3 ft) from the container
- Waste stream or material identification number as assigned by WGS
- Other labels and markings as required by 40 CFR 172 Subparts D and E.

Any of the above information that is not known when the waste is labeled may be added when the information becomes available. The WGS will provide the unique bar codes and serial numbers. A new bar code will be affixed to each container when waste is first placed in the container. Additionally, waste labels must be visible, legibly printed or stenciled, and placed so that a full set of labels and markings are readily visible.

D1.3 Laboratory Samples

All laboratory and sample waste is managed in accordance with the Sampling and Analysis Management Office master task agreements, as part of the contract for each subcontracted laboratory. In general, the laboratory will dispose of any unused sample material. The laboratories are responsible for any waste generated as a result of analyzing the samples. In the event sample material must be returned from the laboratory, only the unused, unaltered samples in the original sample containers will be accepted from the laboratory. These samples will be returned to the waste stream from which they originated. If the laboratory must return altered sample material (e.g., analytical residues), the laboratory will specifically define the types of chemical additives used in the analytical process and assist in making a hazardous waste determination. This information will be provided to the project field team leader and environmental compliance coordinator. Management of this waste will also require separation from the other unaltered samples being returned.

D1.4 Waste Storage and Inspection

Where applicable, waste will be stored in the CERCLA waste storage unit (CWSU) (PBF-ARA-1-CARGO-A) already established at ARA-I. Waste stored in the CWSU will be stored in compliance with the *CERCLA Waste Storage Area Plan for PBF-ARA-1-CARGO-A* (INEEL 1999). This plan will be modified as necessary to accommodate waste proposed for storage in the CWSU. If additional space is needed, s, a new CSA will be established.

The CWSU (or CSA) will meet the requirements of 40 CFR 264 Subpart I. These regulations specify weekly waste container inspections will be conducted at the CWSU (or CSA). Inspectors will look for containers that are leaking, evaluate the integrity of the containers, and verify each container is labeled correctly. Inspections will be documented on the CWSU (or CSA) checklist that is maintained within each CWSU (or CSA). The MCP-3475, "Temporary Storage of CERCLA-Generated Waste at the INEEL," will be used as guidance for the storage and inspection of each CWSU (or CSA).

D1.5 Waste Determinations

All waste generated will be characterized using process knowledge, historical analytical data, and/or analyses of samples, as required under RCRA (40 CFR 262.11) and by DOE (Orders 435.1 and 5400.5). Prior to disposal, all waste must meet the applicable waste acceptance criteria for the disposal facility. Based on the RCRA characterization, waste determinations will be performed and documented by preparing INEEL Waste Determination & Disposition Forms (Form #435.39). Waste determinations will be prepared for all waste destined for disposal and document that it meets the requirements of all on-Site disposal facilities, including the ICDF and CFA Landfill. A hazardous waste determination uses one of two approaches, or a combination of both, to determine if the waste is RCRA hazardous:

1. Process knowledge may be used if there is sufficient existing information to characterize the waste. It may include direct knowledge of the source of the contamination and/or existing validated analytical data.

2. Analysis of representative samples of the waste stream may be performed by either specialized RCRA protocols, or standard protocols for sampling and laboratory analysis that are not specialized RCRA methods. Additionally, process knowledge may influence the amount of sampling and analysis required for characterization.

Manual 17 - Waste Management (Waste Management 2002) provides Management Control Procedures and addresses characterization and management requirements for waste to be transported to a RCRA treatment, storage, and disposal facility (TSDF). The INEEL-specific requirements for treatment, storage, and disposal of characterized waste are addressed in the INEEL WAC. Documentation of all hazardous waste determinations made for this project will be maintained in the INEEL Waste Tracking System (IWTS).

D1.6 Waste Disposition

At the conclusion of the investigation, or when deemed necessary, conditional industrial waste will be disposed of in the CFA landfill, following the protocols and completing the forms identified in the INEEL WAC. When sufficient quantities of waste have been accumulated to ship to one of the INEEL waste management units or off the INEEL to a commercial waste management facility, WGS will complete the appropriate forms and will submit them for approval, as required.

Nonconditional waste will consist of administrative waste such as paper products, non-contaminated clothing, lunch waste, etc. This waste can be placed in clear, plastic bags and placed in an appropriate container for shipment to the INEEL Landfill Complex for disposal. This waste will be nonhazardous and nonradioactive and will not be tracked through the Integrated Waste Tracking System.

Radiological control technicians will be monitoring field activities and will notify personnel of any radiological conditions above background. Working with radiologically contaminated materials will most likely generate contaminated personal protective equipment (PPE) (e.g., gloves, boots, shoe covers, coveralls), as well as contaminated equipment. Both solid and liquid decontamination waste may be generated during the decontamination of equipment. All contaminated waste will be containerized and stored for disposal at the INEEL CERCLA Disposal Facility (ICDF). Contaminated monitoring-waste waste will be included in this waste stream.

It is possible, but highly unlikely, that low-level mixed waste may be generated during the remedial activities. Any low-level mixed waste will be containerized and stored for disposal at the ICDF.

D1.7 Recordkeeping and Reporting

Records and reports related to waste management are required to be maintained as identified by MCP-3475, "Temporary Storage of CERCLA-Generated Waste at the INEEL." These records shall include, but are not limited to, the following:

- Hazardous waste determinations, characterization information, analytical data, and statements of process knowledge (e.g., Form 435.9, "INEEL Waste Determination & Disposition Form")
- CWSU and CSA inspection reports and log-in/log-out history
- RCRA personnel training records
- Environmental checklist
- Documentation of all spills and/or findings.

D1.8 Site-Specific Waste Streams

This section provides site-specific summaries of activities at ARA-01, ARA-12, and ARA-23. Estimates on volumes of waste, anticipated waste streams and waste codes, and probable final disposition are also included. Tables D-1 through D-6 provide a summary of the expected waste streams at each site.

D1.8.1 Auxiliary Reactor Area 01 Summary of Remedial Activities

ARA-01 is a shallow, unlined surface impoundment, roughly 30 × 90 m (100 × 300 ft). The pond received laboratory wastewater from the ARA-I Shop and Maintenance Building (ARA-627). Analytical results have indicated the presence of radionuclides, metals, and organics. The site presents an unacceptable human health risk caused by the presence of arsenic and an unacceptable ecological risk caused by selenium and thallium. The remediation of the ARA-01 site will include those activities outlined in Section 2.2.2 of the Phase II Work Plan.

D1.8.2 Auxiliary Reactor Area 01 Waste Streams

Waste generated during the remediation of the ARA-01 consists of the following: ARA-I Chemical Evaporation Pond excavated soil (including vegetation), PPE, and plastic sheeting. Other potential waste streams include unused/unaltered samples, analytical residues, clean sample containers, hydraulic spills, contaminated equipment, and miscellaneous waste. The anticipated volumes and waste classifications of these waste streams are summarized in Table D-1.

D1.8.3 Auxiliary Reactor Area 01 Disposition

Final disposition for these waste streams includes disposal of soil/vegetation, PPE, plastic sheeting, unused/unaltered samples, analytical residues, and contaminated equipment at the ICDF or another location within the INEEL; and disposal of clean sample containers, hydraulic fluids, and miscellaneous waste streams at the CFA landfill. Table D-2 summarizes the final disposition and packaging for each waste stream.

D1.8.4 Auxiliary Reactor Area 12 Summary of Remedial Activities

ARA-12 is an unlined surface impoundment with approximate dimensions of 50 × 115 m (150 × 370 ft). The pond received low-level liquid waste from reactor research operations conducted at the ARA-III facility. Analytical results have indicated the presence of radionuclides and metals. The onsite presence of Ag-108m creates an unacceptable human health risk, and the presence of copper, mercury, and selenium presents an unacceptable ecological risk. The remediation of the ARA-12 site will include those activities outlined in Section 2.2.2 of the Phase II Work Plan.

D1.8.5 Auxiliary Reactor Area 12 Waste Streams

Waste generated during the remediation of the ARA-12 includes the following: ARA-III Radioactive Waste Leach Pond excavated soil (including vegetation), PPE, and plastic sheeting. Other potential waste streams include unused/unaltered samples, analytical residues, clean sample containers, hydraulic spills, contaminated equipment, and miscellaneous waste. The anticipated volumes and waste classifications of these waste streams are summarized in Table D-3.

Table D-1. Auxiliary Reactor Area 01 waste stream summary.

Waste Type	Anticipated Volume	Waste Classification	Waste Code
Project Site-Specific Waste			
Soil/vegetation	717 m^3 (938 yd^3)	Low-level radioactive	—
PPE	1.53 m^3 (2 yd^3)	Low-level radioactive	—
Plastic sheeting	1.53 m^3 (2 yd^3)	Low-level radioactive	—
Other Potential Waste			
Unused/unaltered samples	< 0.03 m^3 (1.0 ft^3)	Low-level radioactive	—
Analytical residues	< 0.03 m^3 (1.0 ft^3)	Low-level mixed	D002
Clean sample containers	< 0.03 m^3 (1.0 ft^3)	Conditional industrial	—
Hydraulic spills	< 0.77 m^3 (1 yd^3)	Conditional industrial	—
Contaminated equipment	No estimate	Low-level radioactive	—
Miscellaneous	< 0.77 m^3 (1 yd^3)	Conditional industrial	—

Table D-2. Auxiliary Reactor Area 01 waste stream disposition.

Waste Type	Disposition	Packaging[a]
Project Site-Specific Waste		
Soil/vegetation	ICDF[b]	Dump trucks or roll-off containers
PPE	ICDF[b]	Bags
Plastic sheeting	ICDF[b]	Bags
Other Potential Waste		
Unused/unaltered samples	ICDF[b]	19 L (5 gal) drum
Analytical residues	ICDF[b]	19 L (5 gal) drum
Clean sample containers	CFA Landfill	19 L (5 gal) drum
Hydraulic spills	CFA Landfill	19 L (5 gal) to 208 L (55 gal) drum
Contaminated equipment	ICDF[b]	To be determined
Miscellaneous	CFA Landfill	Bags

a. The final packaging configuration will be coordinated with WGS personnel.

b. The ICDF is the primary disposal site; however, as per the ROD (DOE-ID 2000), another location within the INEEL may be selected for permanent disposal.

Table D-3. Auxiliary Reactor Area 12 waste stream summary.

Waste Type	Anticipated Volume	Waste Classification	Waste Code
Project Site-Specific Waste			
Soil/vegetation	1,214 m^3 (1,588 yd^3)	Low-level radioactive	—
PPE	1.53 m^3 (2 yd^3)	Low-level radioactive	—
Plastic sheeting	1.53 m^3 (2 yd^3)	Low-level radioactive	—
Other Potential Waste			
Unused/unaltered samples	< 0.03 m^3 (1.0 ft^3)	Low-level radioactive	—
Analytical residues	< 0.03 m^3 (1.0 ft^3)	Low-level mixed	D002
Clean sample containers	< 0.03 m^3 (1.0 ft^3)	Conditional industrial	—
Hydraulic spills	< 0.77 m^3 (1 yd^3)	Conditional industrial	—
Contaminated equipment	No estimate	Low-level radioactive	—
Miscellaneous	< 0.77 m^3 (1 yd^3)	Conditional industrial	—

D1.8.6 Auxiliary Reactor Area 12 Disposition

Final disposition for these waste streams includes disposal of soil/vegetation, PPE, plastic sheeting, unused/unaltered samples, analytical residues, and contaminated equipment at the ICDF or another location within the INEEL; and disposal of clean sample containers, hydraulic fluids, and miscellaneous waste streams at the CFA landfill. Table D-4 summarizes the final disposition and packaging for each waste stream.

D.1.8.7 Auxiliary Reactor Area 23 Summary of Remedial Activities

ARA-23 is a 17-ha (42-acre) windblown contamination area surrounding the ARA-I and ARA-II facilities. The site also contains subsurface structures remaining after decontamination and dismantlement (D&D) within the facilities. Analytical results have indicated the presence of radionuclides; therefore, waste generated during the remediation of ARA-23 will be considered low-level radioactive. The presence of Cs-137 presents an unacceptable human health risk. The remediation of the ARA-23 site will include those activities outlined in Section 2.2.2 of the Phase II Work Plan.

D1.8.8 Auxiliary Reactor Area 23 Waste Streams

Waste generated during the remediation of the ARA-23 includes the following: Radiologically Contaminated Surface Soils and Subsurface Structures Associated with ARA-I and ARA-II includes excavated soil (including vegetation), rocks, PPE, asphalt, and plastic sheeting. Other potential waste streams include unused/unaltered samples, analytical residues, clean sample containers, hydraulic spills, contaminated equipment, and miscellaneous waste. The anticipated volumes and waste classifications of these waste streams are summarized in Table D-5.

D.1.8.9 Auxiliary Reactor Area 23 Disposition

Final disposition for these waste streams includes disposal of soil/vegetation, rocks, PPE, asphalt, plastic sheeting, unused/unaltered samples, analytical residues, and contaminated equipment at the ICDF or another location within the INEEL; and disposal of clean sample containers, hydraulic fluids, and miscellaneous waste streams at the CFA landfill. Table D-6 summarizes the final disposition and packaging for each waste stream.

Table D-4. Auxiliary Reactor Area 12 waste stream disposition.

Waste Type	Disposition	Packaging[a]
Project Site-Specific Waste		
Soil/vegetation	ICDF[b]	Dump trucks or roll-off containers
PPE	ICDF[b]	Bags
Plastic sheeting	ICDF[b]	Bags
Other Potential Waste		
Unused/unaltered samples	ICDF[b]	19 L (5 gal) drum
Analytical residues	ICDF[b]	19 L (5 gal) drum
Clean sample containers	CFA Landfill	19 L (5 gal) drum
Hydraulic spills	CFA Landfill	19 L (5 gal) to 208 L (55 gal) Drum
Contaminated equipment	ICDF[b]	To be determined
Miscellaneous	CFA Landfill	Bags

a. The final packaging configuration will be coordinated with WGS personnel.

b. The ICDF is the primary disposal site; however, as per the ROD (DOE-ID 2000), another location within the INEEL may be selected for permanent disposal.

Table D-5. Auxiliary Reactor Area 23 waste stream summary.

Waste Type	Anticipated Volume	Waste Classification	Waste Code
Project Site-Specific Waste			
Soil/vegetation/asphalt	23.817 m^3 (31,151 yd^3)	Low-level radioactive	—
Rocks	1,356 m^3 (1,774 yd^3)	Low-level radioactive	—
PPE	30.6 m^3 (40 yd^3)	Low-level radioactive	—
Plastic sheeting	30.6 m^3 (40 yd^3)	Low-level radioactive	—
Other Potential Waste			
Unused/unaltered samples	< 0.57 m^3 (0.74 yd^3)	Low-level radioactive	—
Analytical residues	< 0.57 m^3 (0.74 yd^3)	Low-level radioactive	—
Clean sample containers	< 0.57 m^3 (0.74 yd^3)	Conditional industrial	—
Hydraulic spills	< 15.3 m^3 (20 yd^3)	Conditional industrial	—
Contaminated equipment	No estimate	Low-level radioactive	—
Miscellaneous	< 15.3 m^3 (20 yd^3)	Conditional industrial	—

Table D-6. Auxiliary Reactor Area 23 waste stream disposition.

Waste Type	Disposition	Packaging[a]
	Project Site-Specific Waste	
Soil/vegetation/asphalt	ICDF[b]	Dump trucks or roll-off containers
PPE	ICDF[b]	Bags
Plastic sheeting	ICDF[b]	Bags
	Other Potential Waste	
Unused/unaltered samples	ICDF[b]	19 L (5 gal) drum
Analytical residues	ICDF[b]	19 L (5 gal) drum
Clean sample containers	CFA Landfill	19 L (5 gal) drum
Hydraulic spills	CFA Landfill	19 L (5 gal) to 208 L (55 gal) drum
Contaminated equipment	ICDF[b]	To be determined
Miscellaneous	CFA Landfill	Bags

a. The final packaging configuration will be coordinated with WGS personnel.

b. The ICDF is the primary disposal site; however, as per the ROD (DOE-ID 2000), another location within the INEEL may be selected for permanent disposal.

D2. REFERENCES

DOE-ID, 2000, *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area*, U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho, February 2000.

DOE-ID, 2002, *Idaho National Engineering And Environmental laboratory Waste Acceptance Criteria*, DOE/ID-10381, Rev. 14, September 2002.

INEEL, 1999, *CERCLA Waste Storage Plan for PBF-ARA-CARGO-1-A,* INEEL/EXT-98-00556, Rev. 0, August 1999.

MCP-3475, "Temporary Storage of CERCLA-Generated Waste at the INEEL," Rev. 2, Environmental Restoration, April 2002.

Radiological Control Department, 2000, *Manual 15A – INEEL Radiological Control Manual – Radiation Protection*, Rev. 6, July 2000.

Waste Management, 2002, *Manual 17 – Waste Management*, Rev. 37, December 2002.

Appendix E

Cost Estimate

Project Summary Report

Project Name: ***WAG 5 OU 5-12 Comprehensive Clean-up, Phase II RD/RA***

Project Location: ***ARA***
Estimate Number:***4951-G***

Client: ***R. P. Wells***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
1000		CONSTRUCTION MANAGEMENT	$307,157	$28,903	$10,820	3.22%	$346,880
1100		--CONSTRUCTION SUPERVISION & ENGINEERING	$254,823	$23,979	$8,976	3.22%	$287,778
1110		--CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE	$52,334	$4,925	$1,843	3.22%	$59,102
3000		TITLE II DESIGN	$62,221	$5,855	$2,191	3.22%	$70,267
3400		--DESIGN ACTIVITIES	$55,375	$5,211	$1,950	3.22%	$62,536
3700		--COST ESTIMATE	$6,846	$644	$241	3.22%	$7,731
5000		PROJECT MANAGEMENT	$52,037	$4,897	$1,833	3.22%	$58,767
5100		--PM ADMINISTRATION	$41,341	$3,890	$1,456	3.22%	$46,687
5110		--CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE	$10,696	$1,006	$377	3.22%	$12,079
9000		CONSTRUCTION	$3,304,027	$153,637	$111,300	3.22%	$3,568,964
9100		--CONSTRUCTION SUBCONTRACTS	$1,613,800	$75,042	$54,362	3.22%	$1,743,203
9101		----GENERAL CONDITIONS	$107,569	$5,002	$3,624	3.22%	$116,194
9101.1		------GENERAL CONDITIONS	$107,569	$5,002	$3,624	3.22%	$116,194
9102		----SITEWORK	$1,506,231	$70,040	$50,738	3.22%	$1,627,008
9102.01		------ARA-01	$50,645	$2,355	$1,706	3.22%	$54,706
9102.02		------ARA-12	$82,819	$3,851	$2,790	3.22%	$89,460
9102.03		------ARA-23	$1,372,767	$63,834	$46,242	3.22%	$1,482,842
9300		--CONSTRUCTION SUPPORT	$1,690,228	$78,596	$56,938	3.22%	$1,825,761
9310		----CONSTRUCTION SUPPORT - RADTECH	$150,680	$7,007	$5,076	3.22%	$162,763
9310.01		------ARA-01	$4,638	$216	$156	3.22%	$5,008
9310.02		------ARA-12	$6,954	$323	$234	3.22%	$7,512
9310.03		------ARA-23	$139,069	$6,468	$4,685	3.22%	$150,242
9320		----CONSTRUCTION SUPPORT - ES&H	$23,039	$1,071	$776	3.22%	$24,886
9320.01		------ARA-01	$709	$33	$24	3.22%	$766

INEEL

Project Summary Report

Project Name: *WAG 5 OU 5-12 Comprehensive Clean-up, Phase II RD/RA*

Project Location: *ARA*
Estimate Number: *4951-G*

Client: *R. P. Wells*
Prepared By: *J. C. Grenz*
Estimate Type: *Planning*

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
9320.02		-----ARA-12	$1,063	$49	$36	3.22%	$1,149
9320.03		-----ARA-23	$21,267	$989	$716	3.22%	$22,972
9330		**----CONSTRUCTION SUPPORT - TESTING**	**$1,481,949**	**$68,911**	**$49,922**	**3.22%**	**$1,600,782**
9330.01		-----ARA-01 Testing	$124,104	$5,771	$4,181	3.22%	$134,055
9330.02		-----ARA-12 Testing	$149,989	$6,974	$5,053	3.22%	$162,016
9330.03		-----ARA-23 Testing	$1,207,857	$56,165	$40,689	3.22%	$1,304,711
9330		**----CONSTRUCTION SUPPORT - OTHER**	**$34,559**	**$1,607**	**$1,164**	**3.22%**	**$37,331**
Total ARA Soil			$3,725,442	$193,292	$126,143	3.22%	$4,044,878